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Attachment H

COVER SHEET (PAGE 1 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Proposal Title: "Developing a Methodology to Accurately Simulate the Entrainment of Fish into Agricultural Siphon Diversions in the Sacramento San-Joaquin Delta"

Applicant Name: Kevan Urquhart

Mailing Address: Ca. St. Dept. of Fish & Game, BD&SWPD, 4001 N. Wilson Way, Stockton, CA 95205-2486

Telephone: 209-948-7800

Fax: 209-946-6355

Amount of funding requested: $ 200,000 for two years

Indicate the Topic for which you are applying (check only one box). Note that this is an important decision: see page __ of the Proposal Solicitation Package for more information.

- ☐ Fish Passage Assessment
- ☐ Fish Passage Improvements
- ☐ Floodplain and Habitat Restoration
- ☐ Gravel Restoration
- ☐ Fish Harvest
- ☐ Species Life History Studies
- ☐ Watershed Planning/Implementation
- ☐ Education
- ☒ Fish Screen Evaluations - Alternatives and Biological Priorities

Indicate the geographic area of your proposal (check only one box):

- ☐ Sacramento River Mainstem
- ☐ Sacramento Tributary: _____
- ☒ Delta
- ☐ East Side Delta Tributary: _____
- ☐ Suisun Marsh and Bay
- ☐ San Joaquin Tributary: _____
- ☐ San Joaquin River Mainstem
- ☐ Other: _____
- ☐ Landscape (entire Bay-Delta watershed)
- ☐ North Bay: _____

Indicate the primary species which the proposal addresses (check no more than two boxes):

- ☐ San Joaquin and East-side Delta tributaries fall-run chinook salmon
- ☒ Winter-run chinook salmon
- ☐ Spring-run chinook salmon
- ☐ Late-fall run chinook salmon
- ☐ Fall-run chinook salmon
- ☒ Delta smelt
- ☐ Longfin smelt
- ☐ Splittail
- ☐ Steelhead trout
- ☐ Green sturgeon
- ☐ Striped bass
- ☐ Migratory birds

COVER SHEET (PAGE 2 of 2)

May 1998 CALFED ECOSYSTEM RESTORATION PROPOSAL SOLICITATION

Indicate the type of applicant (check only one box):

- [x] State agency
- [ ] Federal agency
- [ ] Public/Non-profit joint venture
- [ ] Non-profit
- [ ] Local government/district
- [ ] Private party
- [ ] University
- [ ] Other: _____

Indicate the type of project (check only one box):

- [ ] Planning
- [ ] Implementation
- [ ] Monitoring
- [ ] Education
- [x] Research

By signing below, the applicant declares the following:

(1) the truthfulness of all representations in their proposal;

(2) the individual signing the form is entitled to submit the application on behalf of the applicant (if applicant is an entity or organization); and

(3) the person submitting the application has read and understood the conflict of interest and confidentiality discussion in the PSP (Section II.K) and waives any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent as provided in the Section.

(Signature of Applicant)

II. Executive Summary

a. Project Title & Applicant Name

"Developing a Methodology to Accurately Simulate the Entrainment of Fish into Agricultural Siphon Diversions in the Sacramento-San Joaquin Delta"; Kevan Urquhart, Senior Biologist Supervisor (Marine/Fisheries), Fish Facilities & Laboratory Support Programs, Bay-Delta & Special Water Projects Div., Dept. of Fish & Game.

b. Project Description and Primary Biological/Ecological Objectives

We propose to purchase/lease a barge, and mount a pipe, pump, and flume to hold a sampling net on board it, then conduct paired and simultaneous sampling with DWR of one of their Sherman Island agricultural diversion siphons. We will use either a fish-friendly hidrostal centrifugal pump, or a suction dredge pump. We will use a net identical to the one DWR will be using in their diversion's outfall to prove whether our pumped method can duplicate the entrainment of an agricultural diversion siphon in the Delta.

Our data will be analyzed with paired sampling statistics, to demonstrate to what degree our methodology is likely to be precise enough to adequately predict/characterize the entrainment of siphons in any area of the Delta we might choose to sample in the future. If entrainment via both methods is highly correlated, we intend to develop a plan to use this same barge in FY 1999-2000 to sample various areas and channel types in the Delta. We envision sampling near to and duplicating/simulating the entrainment of various agricultural diversion pumps/siphons, in order to characterize which diversions, areas, or channel types in the Delta should be prioritized for screening of Threatened and Endangered species, and which others may not be cost-effective to screen at all.

c. Approach/Tasks/Schedule

We propose to complete this project in six separate, phased tasks. Initially (9/98-2/99) we will pursue completion of State and Federal T&E species take permits; US Coast Guard and State Lands Commission installation/navigation permits; procurement, service, and leased equipment contracts; site evaluation and selection; and final barge design and study plan review (Tasks 1-3).

We will assemble the barge-based sampling station, test it prior to transport to the study site in Horseshoe Bend between Decker and Sherman Islands, install it on site and conduct pre-sampling tests between 2/15-3/31/99 in Task 4.

As part of Task 5, paired sampling will occur over at least 32, and as many as 44, 8-hour sampling periods between 4/1-8/31/99, in concert with planned sampling by DWR's Ecological Services Office (DWR-ESO). Sampling will be randomized across various 8-hour periods representing day, night, and crepuscular time periods. A database of all project data will be up and accessible on the IEP's and DFG-Bay/Delta Division's Internet web pages by 9/31/99.

A summary article discussing all project results will be written for the Fall 1999 IEP Quarterly Newsletter. An interagency reviewed IEP Technical Report in the series published by DWR will be completed by 12/99, covering all project results, analysis, conclusions, and recommendations in detail. At least two oral/poster presentations will be made of the study results at the IEP's Annual Meeting in Asilomar in 2/2000, and at the Annual Meeting of the California-Nevada Chapter of the American Fisheries Society (Cal-Neva AFS) in 3/2000.

d. Justification for Project and Funding by CALFED

Screening the 2209 agricultural diversions in the statute Delta is a priority objective of the CALFED ERPP, CVPIA AFRP & AFSP, but it could cost over $66,000,000 to screen every one with the best available technology in positive barrier screens. Screening would be beneficial to

multiple species in many habitats of the Delta, after they are larger than egg and larval stages. All three plans/programs call for the prioritization and identification of which sites should be screened or consolidated. Very little useful information is available to make these decisions or develop a plan. This pilot sampling technique, if proven effective, could be used in the following two years to quickly develop the data needed for such plans, prioritization, and cost-benefit analyses.

e. Budget Costs & Third Party Impacts

The total proposal costs $263,414, of which we are requesting $200,000 from CALFED. We have preliminary conceptual approval of the proposal from DWR-ESO, and have reason to expect that they will be willing to provide $63,414, which is equal to 50% of permanent staff salaries and general operations. Their co-funding is dependant on this proposal also being approved by the IEP as part of its Calendar Year 1999 Planning Process (preliminary approval due 9/1/98, final approval given 11/15/98). There are no known third party impacts from this pilot study.

f. Applicant Qualifications

This study proposal will be executed by three graduate-degreed professional staff scientists (Senior Biologist Supervisor, Associate Fishery Biologist, Range B Fishery Biologist) and two experienced technicians of the Fish Facilities Research Unit in the Fish Facilities Program of DFG's Bay-Delta & Special Water Projects Division. This Unit has conducted applied fish passage and screening research in the Delta for the last 28 years, each of the current staff have more than a decade of applied aquatic research experience, and each have received specialized training in fish passage and screening technology. This Unit is a member of a Division that has been conducting applied terrestrial and aquatic research in the Delta, Suisun Marsh, and the Sacramento/San-Joaquin River basins for 37+ years.

g. Monitoring & Data Evaluation

There is no monitoring associated with this proposal as its intent is to develop a robust field technique for application over the following two years, to collect data necessary to develop a scientific management plan for the screening of small diversions in the statute Delta. Technical review and oversight of the study design and ongoing project will be accomplished as noted below in Section **II h.** Statistical analyses will be reviewed by DFG's Biometrics Unit.

h. Local Support/Coordination with other Programs/Compatibility with CALFED

If recommended by CALFED, we will seek local input and review from various local entities (Farm Bureau, Reclamation/Levee Maintenance/Water Districts), through the auspices of the Bay-Delta Advisory Council, Delta Protection Commission, and the Delta Chambers of Commerce. Our proposal has been submitted the IEP Ag/Municipal Diversion PWT for review, and will also formally be reviewed by the IEP Fish Facility Coordination and Review Team, as part of the IEP's Calendar Year 1999 planning cycle to secure matching funding. Both groups have representation from the NMFS, USFWS, USBR, DWR, and NRCS. We will also seek review from, and coordinate with DFG's Unscreened Diversions Program, DFG-Inland Fisheries Division's Interagency Screen Team, the CVPIA's Anadromous Fish Screen Program (AFSP), and NRCS' Fish Screen Program. This project is a CALFED objective listed in the ERPP and Appendices to the Proposal Solicitation Package.

III. Title Page

a. Title of Project

Developing a Methodology to Accurately Simulate the Entrainment of Fish into Agricultural Siphon Diversions in the Sacramento-San Joaquin Delta.

b. Name of Applicant or Principle Investigator

Kevan A. F. Urquhart, Senior Biologist Supervisor (Marine/Fisheries),
Fish Facilities & Laboratory Support Programs,
Bay-Delta & Special Water Projects Div., Dept. of Fish & Game
4001 N. Wilson Way Stockton, Ca. 95205-2486
(209)948-7800, CALNET 423-7800, FAX (209)946-6355, kurquhar@delta.dfg.ca.gov

c. Type of Organization & Tax Status

State Agency, tax exempt.

d. Tax I.D. Number or Contractors License

N/A

e. Participants or Collaborators in Implementation

DFG: Fish Facility Research Unit leadperson - Robert Fujimura, M.A., Associate Biologist; Fish Facility Research Unit staff - George Edwards, M.A., Biologist Range B; Ramiro Soto and Paul Macias, Fish & Wildlife Assistant 1s; various Scientific Aides.

DWR- Ecological Services Office - Screening Program: Sherman Island Screen Evaluations Project leadperson - Ted Frink, Environmental Specialist IV (Specialist); Shawn Mayr, P.E., Associate Civil Engineer.

IV. Project Description

a. Project Description and Approach

The Fish Facility Research Unit proposes to purchase/lease a barge (approx 20' x 40'), mount a pipe, pump, and flume to hold a sampling net on board it, and conduct paired and simultaneous sampling with DWR of one of their Sherman Island agricultural diversion siphons. This work will be conducted concurrently with DWR's Sherman Island Screen Evaluation Project, which is already planned and funded for spring 1999. We will use either a fish-friendly hidrostal centrifugal pump, equivalent to the one being tested by the USBR at Red Bluff and soon at Tracy, or a suction dredge pump. Both pumps vanes do not force fish against the pump housing, and the former have been shown in initial trials to pass fish predominantly without harm. We will be using a net identical to the one DWR will be using in their diversion's outfall to prove whether our pumped method can duplicate the entrainment of an agricultural diversion siphon in the Delta. DFG and DWR will be using nets and sampling methodologies similar to those already applied over the last 10+ years by DFG's Fish Facilities Research and Monitoring Units at a variety of facilities and locations in the Delta (e.g. Mallard Slough, Contra Costa Canal, North Bay Aqueduct, various smaller scale agricultural diversions, and Suisun Marsh). These nets accurately sample fish greater than 20-24 mm, which is the size range effectively screened with current positive barrier technology. Using the same diameter pipe and pumping at the same cubic-feet/second (CFS) as the siphon (estimated at < 30 CFS), but just outside its immediate zone of influence, we hope to simulate its entrainment.

Data collected from our pumped agricultural diversion simulation and DWR's siphon on to Sherman Island will be analyzed with paired sampling statistics. Pearson's univariate correlation (r) or Kendall's nonparametric rank correlation (Tao) will be used to see if the abundance of Delta smelt, juvenile salmon, longfin smelt, or splittail are very similar via both sampling methods. Multivariate Canonical Correlation (R^2) will be used to evaluate the whether the multi-species catch abundances are very similar between each sampling method. Discriminant Function Analysis (DFA) will be used to show precisely how predictive the abundance of various species in the pumped diversion simulation is of the abundance of the species collected in the real agricultural siphon diversion. Thus, it will define to what degree our methodology is likely to be precise enough to adequately predict/characterize entrainment of siphons in any area we might choose to sample in the future.

If entrainment via both methods is highly correlated (proposed criteria: $r/R^2 > 80\%$, DFA predictive at $>75\%$), we would develop a plan to use this same barge in FY 1999-2000 to sample various areas and channel types in the Delta. The cost of developing such a plan cannot be accommodated within the CALFED's $200,000 limit for this proposal and its topic area. We are applying for staff time to develop the plan, pending the success of this pilot study, in Fall 1999 as part of the IEP's Calendar Year 1999 Planning Cycle (preliminary approval 9/98, final decision 11/98). We envision the barge sampling near to and duplicating the entrainment of various agricultural diversion pumps/siphons, to characterize which diversions, areas, or channel types in the Delta should be prioritized for screening of Threatened and Endangered species, and which others may not be cost-effective to screen at all. We are also applying for half of all permanent staff time and general operating expenses in this proposal to be covered by the IEP (preliminary approval 9/98, final decision 11/98), leaving only equipment, temporary help, and project-specific operations costs to be covered by this grant, which would reduce the cost of our proposal as shown in Section V.

b. Proposed Scope of Work

Task 1. Work: Arrange the purchase/lease a barge, 24" pipe, fish friendly pump, generator/pump motor, sieve net, navigation lights/signs/symbols. Develop final design for a mobile sampling station on the barge with the net installed in a flume similar to that being used currently to sample the outfall from the over pressure release valve of Contra Costa Water District's Mallard Slough intake. We will also investigate the option of a design for a net in the water off the side of the barge, which would allow us to use a smaller, more mobile barge. Schedule: 9/1/98-1/31/99. Budget sub-total: $22,865. Deliverable: Executed lease contracts/purchase documents and final design plan for a functional mobile sampling station.

Task 2. Work: Measure the zone of influence of the existing Sherman Island siphon by measuring the distance from the intake that altered flow vectors can be detected during short term pumping trials. Select the nearest optimal site for the anchoring of the test barge. Pursue any necessary Coast Guard or State Lands Commission permits for temporarily anchoring the barge. We expect permits may be needed from the USCG as the barge may be considered an navigation hazard, but doubt any SLC permits will be needed for anchoring behind Decker Island in Horseshoe Bend, unless we discover we need to install semi-permanent structure such as moorings or pilings to anchor the barge safely. Schedule: 9/1-12/31/98. Budget sub-total: $6,182. Deliverable: Necessary permits and defined installation site maps.

Task 3. Work: Pursue T&E species take permitting for Delta smelt and splittail with the USFWS under the IEP take permit consultation process, as some Delta smelt/splittail will be lost, even though all fish will be returned to the Sacramento River. Pursue T&E species consultation with NMFS for winter-run and spring-run chinook salmon and steelhead under the IEP take permit consultation process, with the goal of developing mutually agreed upon take limits for spring-run and steelhead, and avoidance measures (sampling restrictions) for winter-run, as some fish will be lost in the sampling process, even though all fish will be returned to the Sacramento River. Schedule: 7/1/98-2/28/99 (process already begun with initial contacts). Budget sub-total: $15,289 Deliverable: Project included in 1999 IEP permits or with its own Section 7 permit.

Task 4. Work: Assemble the mobile sampling station on the barge. Test initial installation of equipment prior to relocation. Tow the barge to the Sherman Island sampling site behind decker island and anchor it with four point anchoring system or additional options. Install the curved end of the 24" pipe to the fish friendly pump on the barge, ensuring that it installed at the same depth and distance off shore as DWR's Sherman Island siphon, but outside it's zone of influence. Schedule: 2/15-3/31/99. Budget sub-total: $26,796. Deliverable: a functional mobile sampling station available for inspection and initial testing prior to relocation (3/15); followed by the sampling station in place on-site, tested for stability of the installation and anchoring system, and available for inspection and initial testing (3/22).

Task 5. Work: Conduct paired sampling (at least two 8-hour days, weekly) with DWR whenever they are sampling their siphon. Conduct additional sampling of DWR's siphon, simultaneous with the pumped barge sampling, during seasons of high target species abundance (salmon, smelt, splittail), as indicated by ongoing IEP-RTM/USFWS/DFG sampling (8-hour time period randomly assigned to day/night/crepuscular periods). Minimum target of 40, 8-hour sampling periods. Schedule: 4/1-8/31/98. Budget sub-total: $163,484. Deliverable: QA/QC'd data up on the DFG-Bay/Delta Division and IEP server for Internet access by 9/31/98.

Task 6. Work: 1) Data analysis, reporting, and presentation. Prepare an IEP Technical Report for the series published by DWR, and a summary in the Fall/Winter 1999 IEP Quarterly Newsletter. 2) Present data as a talk/poster in the following forums: IEP Asilomar conference in 2/2000, California-Nevada Chapter of the American Fisheries Society Annual Meeting in 3/2000, any in-State screening or fish passage forums (e.g. Family Water Alliance Fish Screen Day, Interagency Fish Screening and Fish Passage Conference in the Resources Auditorium). Schedule: 9/1-12/31/99 for data analysis and report writing, 1/1-3/31/2000 for presentations. Budget sub-total: $28,798. Deliverable: final IEP Technical Report published in the series by 12/1999; Fall/Winter IEP Quarterly Newsletter article, 9-12/99, depending on submission deadlines and availability of newsletter space; talk or poster at the 2/2000 IEP Conference and 3/2000 Cal-Neva AFS Meeting.

[NOTE: If this project is successful, we will pursue IEP/DWR/CVPIA-AFSP/CALFED funding to develop a recommended sampling regime for the use of the sampling barge in the Delta to characterize the entrainment of agricultural siphons for the years 2000-2002, which will be reported in a second IEP Technical Report that develops recommendations for screening priorities in the statute Delta]

c. Location and/or Geographic Boundaries of the Project

First year installation north of Sherman Island, behind Decker Island in Horseshoe Bend, off the Sacramento River, south-west of Rio Vista in the West Delta, Sacramento Co. (Figure 1). Technique potentially applicable to answering screening priority question throughout the statute Delta, and possibly Suisun Marsh

d. Expected Benefit(s)

Landowners have been understandably reluctant to allow access to their land and agricultural siphon diversions to measure entrainment losses, due to CESA/Federal ESA regulations which might require them to install costly screens (tens of thousands of dollars) and undertake O&M costs for the screens in perpetuity (thousands of dollars annually). They are also concerned about a lack of available legal assurances that they won't have to upgrade functional screens at additional cost, if new species are listed. The IEP/DWR attempted to undertake an agricultural screening evaluation program, as recommended by DFG, but were unable to gather all the data desired, due to redirection of staff to higher IEP/DWR priorities and problems with land-owner or water/reclamation-district access. Our pilot project to test a new sampling methodology, if successful, could be used to characterize entrainment by geographic area, channel type, diversion size, intake pipe depth, and other factors, without pursuing private land access. This would allow CALFED, the IEP, and State and Federal resources agencies to develop a screening plan for the Delta. A plan based on quantitative data, collected with this methodology in a follow on project in 2000-2002 (duration dependant on sampling goals), would provide the necessary information to prioritize screening for CALFED Category 3, USBR-USFWS Anadromous Fish Screen Program (AFSP), and CVPIA expenditures on agricultural diversions in the Delta. It would show where screening would be most cost effective, and suggest areas or channel types where diversions could be consolidated or transferred in order to avoid the most serious entrainment problems with Threatened and Endangered species. This is clearly an important matter, given the cost of indiscriminately screening all of the 2,209 agricultural diversions in the statute Delta of at least $66,270,000 (Brown 1982 estimated $10-30,000,000).

Prioritizing screening in the Delta to optimize the effectiveness of screening funds will benefit fish occupying tidal and perennial aquatic habitat (freshwater), instream aquatic habitat,

adjacent shaded riverine aquatic habitat, and mid-channel islands and shoals habitat, where any of the former are influenced by agricultural diversions (from Attachment B to the Proposal Solicitation Package of May 1998). Primary priority species or populations which will benefit from optimizing in-Delta agricultural diversion screening efforts are: 1st Tier - Sacramento winter-run, spring-run, and late-fall-run chinook salmon and steelhead trout juvenile emigrants in the North, West, and Central Delta; San Joaquin and east-side Delta tributary fall-run chinook salmon juvenile emigrants in the East, central, and South Delta; and Delta smelt throughout the Delta. 2nd Tier - longfin smelt and splittail throughout the Delta. Secondary priority species or populations which will benefit from optimizing in-Delta agricultural diversion screening efforts are: striped bass and American shad throughout the Delta; and Sacramento fall-run chinook salmon in the North, West and central Delta (from Attachment B to the Proposal Solicitation Package of May 1998).

e. Background and Ecological/Biological/Technical Justification

As noted in the CALFED Proposal Solicitation Package of May 1998, "there is relatively little data that can be used to identify where the biological benefits would be greatest in a program to screen smaller [agricultural] diversions". The only sources of quantitative information on variation in entrainment at small agricultural diversions in the Sacramento-San Joaquin Delta are; 1) bi-weekly file reports for 1997 & 98 on the 'Suisun Marsh Diversions Monitoring Program', by Jim Starr of DFG's Bay-Delta & Special Water Projects Division, who's data have not yet been fully analyzed; 2) the final draft 1/8/98 IEP Technical Report: "Delta Agricultural Diversion Evaluation Summary Report, 1993-1995" by Cook, L. & L. Buffaloe, DWR; 3) Brown, R. L. 1982. Screening agricultural diversions in the Sacramento-San Joaquin Delta, an internal DWR report; and 4) Allen, D. H. 1975. Loss of striped bass (Morone saxitilis) eggs and young through small, agricultural diversions in the Sacramento-San-Joaquin Delta. Ca. Dept. of Fish & Game, Anadromous Fisheries Branch Administrative Report No. 75-3.

Cook & Buffalo, 1997 indicated that the number and variety of species entrained by agricultural diversions is not necessarily the same as those collected through trawls made nearby. Differences between sampling the outflow of diversions and nearby biological trawl sampling may be partially due to gear differences, but results to date do support the contention that smaller diversions may not entrain every species in the water column or even proportional to overall average fish densities in the water column. Jim Starr's data, while not yet formally analyzed, qualitatively supports the same conclusion. However, Allen 1975 concluded that the density of striped bass eggs and larvae in the San Joaquin River south of Sherman Island were not significantly different than those entrained into siphons on the south side of the island. Brown 1982 tried to crudely estimate losses to all agricultural diversions in the statute Delta of striped bass and salmon, concluding that 570,000,000+ striped bass (eggs, larvae, & juveniles) may be entrained during the April-July peak diversion season, but less than 120,000 juvenile salmon.

Given the cost to screen all the agricultural diversions in the Marsh (371) and Delta (2,209), or the cost of consolidating them to make them cost-effective to screen, it would be worthwhile to collect data that would allow the agencies and CALFED to prioritize screening efforts. The first IEP/DWR study mentioned above attempted to do this, but sampled only 3 to 5 sites intermittently over three years due to lack of landowner cooperation to allow trespass, and staffing problems. The successful completion of the Suisun Marsh Diversions Monitoring Program may provide the necessary information to develop screening priorities in the Marsh, but won't provide information for the Delta.

Our proposal is congruent with the goals of: 1) the USBR-USFWS AFSP, though they have not yet finalized a written long term plan of priorities. 2) the CVPIA 1997 Revised Draft

Restoration Plan for the Anadromous Fish Restoration Program; specifically the Sacramento San Joaquin Delta section, Evaluation 12 - "Evaluate the benefits to juvenile anadromous fish and opportunities for screening diversions and re-locating riparian diversions in the Delta and Suisun Marsh", a medium priority action in a high priority "watershed"; and Action 15 - "Implement actions to reduce losses of juvenile anadromous fish resulting from unscreened or inadequately screened diversions in the Sacramento-San Joaquin Delta and Suisun Marsh, if Evaluation 12 determines significant benefits to juvenile anadromous fish can be achieved by screening", a medium priority action in a high priority "watershed". Thus, the CVPIA-AFRP specifically recognizes that studies like ours need to occur before a cost effective plan for screening can be developed. 3) the CALFED ERPP mentions screening of all diversions, not just the CVP/SWP. Unscreened diversions are a primary stressor contributing to the decline of all listed fish species, and almost every Delta fish species mentioned in the ERPP's Volume 1, Species & Species Group Visions, pages 133-177. Screening in-Delta diversions is listed as a beneficial action for all listed fish species, and almost every Delta fish species. Entrainment in unscreened diversions is defined as the major primary stressor besides the hydraulic changes caused by water diversions (ERPP Volume 1, Visions for Reducing or Eliminating Stressors, Water Diversions, pages 274-277), and are the subject of a specific Programmatic Action, "Screen small siphon and pump diversions in the Delta...", page 277. The ERPP's Volume 2, Sacramento-San Joaquin Delta Ecological Zone, Visions for Reducing or Eliminating Stressors, page 32, lists screening and consolidating water diversions as a goal; the following Implementation Objectives, Targets, and Programmatic Actions section under Water Diversions, page 58, lists "Target 1: Reduce the loss of important fish species" as one that "has sufficient certainty of success to justify full implementation in accordance with adaptive management, program priority setting, and phased implementation". This pilot study, if successful, provides the data needed for adaptive management and priority setting for the screening of agricultural diversions in the Delta.

f. Monitoring and Data Evaluation

No monitoring of the project itself will be conducted because this is not a habitat action, and therefore monitoring of the project is not applicable. This proposal is being submitted to the IEP Agricultural/Municipal Diversion Project Work Team on 6/22/98, and the IEP Fish Facility Technical Review and Coordination Team in mid-July. Both teams will critique, review and approve/reject the study design as part of the normal IEP Planning Process for Calendar Year 1999, which culminates with IEP Coordinator and Management Team review by 11/98. Preliminary approval of this concept by both teams is required by IEP Calendar Year 1999 Planning Process in 9/98. Both teams will review the data analysis and draft reports on the project as part of the professional/technical and interagency review required of all IEP projects and any publication in the IEP Technical Report Series. Data analysis procedures will also be reviewed by statisticians in the DFG-Technical Services Branch-Biometrics Unit.

g. Implementability

Implementability depends on the acquisition or lease of a fish friendly hidrostal centrifugal pump, or a suction dredge pump that will minimize damage to entrained fish prior to sampling in the sieve net, and our ability to vary the pumping rate of this pump to simulate the tidally varying pattern of entrainment at a pump-primed but gravity fed siphon. We expect that the directed take resulting from our sampling will be moderate-minimal and can be accommodated as part of the normal annual renegotiation of the annual IEP take permits with the NMFS and USFWS. Informal consultation on this subject has already begun. Thus, we should know within the next 30-60 days, whether we need to begin direct consultation with NMFS/USFWS during the seven month period of 8/88-2/99, which should provide enough time to acquire the necessary permits.

U.S. Coast Guard and State Lands Commission permits are administrative and can easily be acquired in the next seven months.

DWR-ESO has already expressed preliminary support for this proposal, based on initial concept documents, and their further review and comment will be sought. DWR is the majority voter/shareholder in the Sherman Island Reclamation and Levee Maintenance District. Thus, local support is not necessary at this time, nor is it even necessary for the implementation of further studies in 2000-2002. However, broad support is always desirable, though in this case local support may be unlikely/non-committal due to landowner concerns mentioned above under "IV, d. Expected Benefits". Based on recommendations from CALFED we can pursue local coordination initially, or at the end of this study prior to developing the 2000-2002 study plan, with various local entities (Farm Bureau, Reclamation/Levee Maintenance/Water Districts), through the Bay-Delta Advisory Council, Delta Protection Commission, and the Delta Chambers of Commerce.

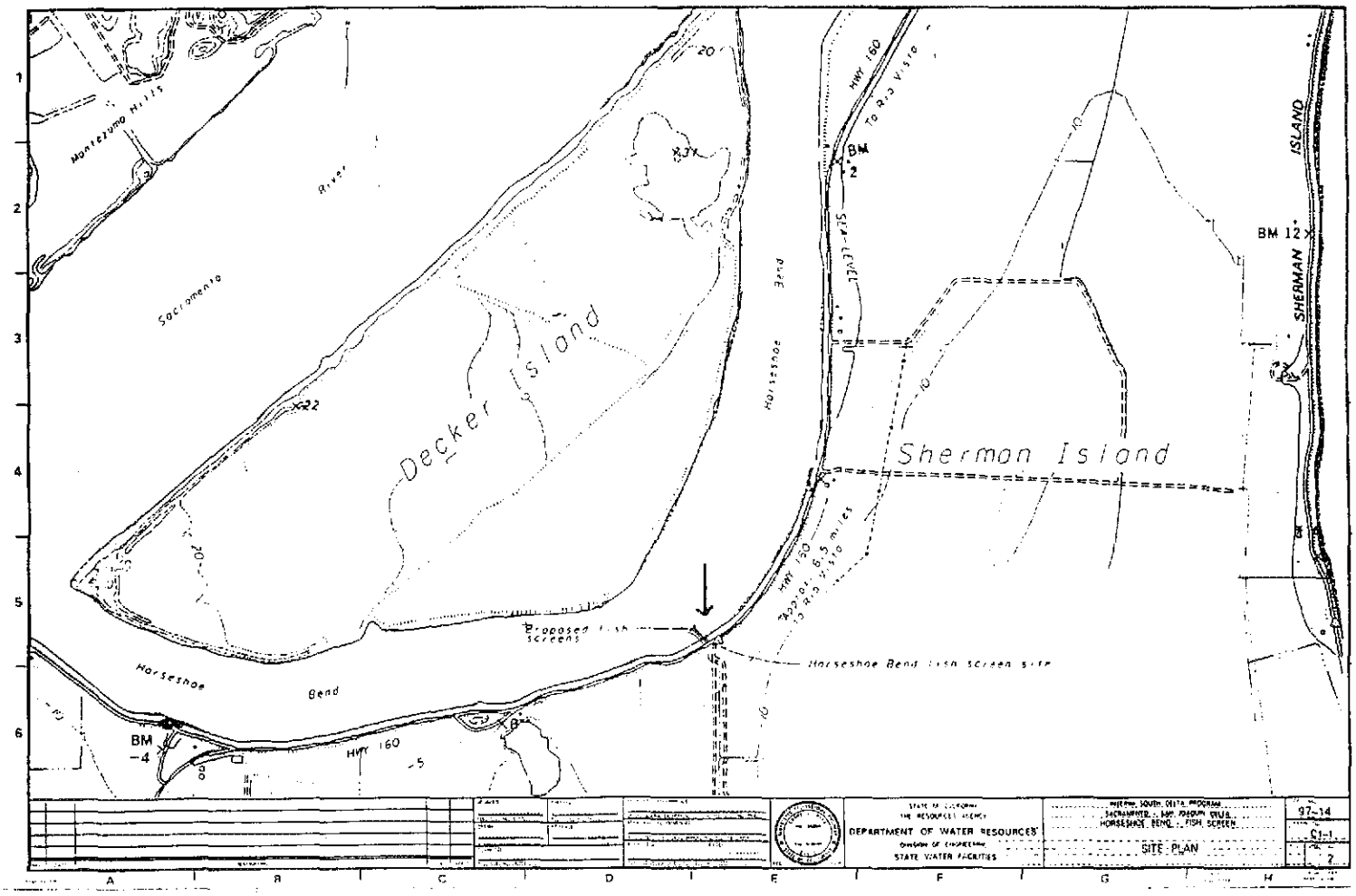

Figure 1. The location of DWR's Sherman Island screens, and the approximate location for the installation of the sampling barge.

V. Costs and Schedule to Implement Proposed Project

a. Budget Cost

Table 1- Cost Breakdown Table

Project Phase & Task	Direct Labor Hours	Direct Salary & Benefits	Overhead Labor (General, Admin. & Fee)	Service Contracts	Material & Acquisition Contracts	Miscellaneous & other Direct Costs	Total Cost
Task 1	295	$8,742	$3,586		$9,000	$1,536	$22,865
Task 2	152	$4,041	$969			$1,171	$6,182
Task 3	383	$10,896	$2,398			$1,995	$15,289
Task 4	674	$12,118	$4,202	$500	$7,500	$2,476	$26,796
Task 5	1,878	$42,129	$25,638	$500	$86,835	$8,382	$163,484
Task 6	739	$20,430	$4,516			$3,852	$28,798
Totals:	4,121	$98,356	$41,311	$1,000	$103,335	$19,412	$263,414
IEP Match	1,589	$44,412	$9,946			$9,056	$63,414
CALFED	2,533	$53,944	$31,365	$1,000	$103,335	$10,356	$200,000

The IEP match will come out of our base staff budget for the Fish Facility Research Unit, which is funded through a contract with DWR, if this study proposal is approved during the IEP Calendar Year 1999 Planning Cycle between 9 & 11/98.

b. Schedule Milestones

The following milestones are congruent with those Tasks shown in "IV, b. Proposed Scope of Work", and the DFG would bill for costs affiliated with each task that are actually incurred in two lump sum bills covering the periods 7/1/98-6/30/99, and 7/1/99-3/31/2000. Final payment for the first period is mandated by State budget standards, and cannot be linked to any significant deliverable, since none are due until after 6/31/98, the end of the State's 98-99 Fiscal Year. The bill will be supported by an itemized monthly billing showing expenses and labor costs incurred by direct invoices, and monthly labor cost and effort accounting procedures in place for DFG. The only deliverables that can be confirmed by a Contract Manager in the first billing period are an on-site inspection of the assembled sampling barge at the docks, an on-site inspection of its installation and operation at Sherman Island, copies of the necessary permits obtained from regulatory agencies for the project, and copies of the first two quarterly reports required on page 14 of the Proposal Solicitation Package. Final payment for any stage of the second period can be based on the deliverables.

Task 1. Arrange to purchase/lease the barge sampling station. Final Due Date: 1/31/99. Budget sub-total: $22,685. Deliverable: Executed lease contracts/purchase documents and final design plan for a functional mobile sampling station.

Task 2. Select sampling site obtain U.S. Coast Guard or State Lands Commission permits. Final Due Date: 2/31/99. Budget sub-total: $6,182. Deliverable: Necessary permits and defined installation site maps.

Task 3. Pursue T&E species take permitting with the USFWS/NMFS. Final Due Date: 2/28/99. Budget sub-total: $15,289. Deliverable: Project included in 1999 IEP permits or with its own Section 7 permit.

Task 4. Install barge at sampling site, and pre-test. Final Due Date: 3/31/99. Budget sub-total: $26,796. Deliverable: functional mobile sampling station in place on-site, and tested for stability of the installation and anchoring system. Available for inspection and initial testing.

Task 5. Conduct paired sampling. Final Completion Date: 8/31/98. Budget sub-total: $163,484. Deliverable: QA/QC'd data up on the DFG-Bay/Delta Division and IEP server for Internet access by 9/31/98.

Task 6. Data analysis, reporting, and presentation. Final Due Dates: 12/31/99 for data analysis and report writing, 3/31/2000 for presentations. Budget sub-total: $28,798. Deliverable: final IEP Technical Report published in the series by 12/1999; Fall/Winter IEP Quarterly Newsletter article, 9-12/99, depending on submission deadlines and availability of newsletter space; talk or poster at the 2/2000 IEP Conference and 3/2000 Cal-Neva AFS Meeting.

c. Third Party Impacts

None for this specific one year pilot project.

VI. Applicant Qualifications

This project will be conducted by the Fish Facilities Research Unit, lead by Bob Fujimura, and staffed by George Edwards, Ramiro Soto, Paul Macias and various temporary Scientific Aides. This Unit is within the Fish Facilities Program supervised by Kevan Urquhart, of the Bay-Delta & Special Water Projects Div., Dept. of Fish & Game. This Division of the DFG has been conducting applied research on the S.F. Bay and Sacramento-San Joaquin Delta for 37 years, and the Fish Facilities Program has been conducting applied bioengineering research on fish passage, screening, and agricultural/municipal/SWP/CVP diversions for 28 years. We are cooperating with staff from the Fish Facilities Unit of DWR's Ecological Services Office who will be doing most of the sampling of the Sherman Island siphon. Administration and technical oversight will be provided by Mr. Urquhart. The project will be lead by Mr. Fujimura, who will be responsible for the technical details, project management, report writing, and data analysis, assisted by Mr. Edwards. The field project will be conducted by Mr. Edwards, Soto, and Macias, with other temporary staff. Short staff biographies are included below and complete resumes of some individual biologists can be found on our home-page at http://www.delta.dfg.ca.gov.

Kevan Urquhart: Senior Biologist Supervisor (Marine/Fisheries), A.B in Zoology U.C. Berkeley 1980, M.A. in Biological Sciences Ca. St. Univ. Fullerton 1984, Certificate in Land Use & Environmental Planning U.C. Davis 1995. Certified Fishery Professional - American Fisheries Society, member of the American Institute of Fishery Research Biologists. 3/95-current: lead Fish Facilities Program ($1,420,00; 24+staff) to plan for, monitor, and evaluate fish passage, large scale diversion, and screening projects in the Sacramento-San Joaquin Delta/San Francisco Bay-Estuary. The Program is composed of three units: Research, Monitoring, and

Salvage Operations; staffed by two Assoc. Fishery Biologists, 3.5 Range-B Fishery Biologists, one Fish Hatchery Manager 1, two Fish and Wildlife Asst. IIs, 5.25 F&W Asst. I's, and 10+ Scientific Aides, Student Assistants, and Seasonal Clerks. Member of the Interagency Ecological Program (IEP) Management Team, oversee two IEP-Project Work Team Committee Chairpersons. Coordinate with other State & Federal Agencies; member CALFED 'Diversion Effects on Fish Populations' and 'Interagency Fish Facilities Technical' Teams. Joined DFG in 1985 at the Bay-Delta Division in Stockton, served there as a Range B Fishery Biologist on the Sturgeon, Adult Striped Bass and Resident Fishes Study and striped Bass Health Monitoring Study; promoted to lead the Selenium Verification Study as an Associate Water Quality Biologist; was an Associate Fishery Biologist with the Inland Fisheries Division's Klamath-Trinity River Basin Salmon & Steelhead Program, and an Environmental Specialist III with the Environmental Services Division's Stream Flow & Habitat Evaluation Program, before being promoted back to Bay-Delta in his current position.

Robert W. Fujimura: Associate Biologist (Marine/Fisheries), Fish Facilities Program, 5/96-present. B.S. in Fisheries and B.A. in Biology Humboldt State University 1977, Limnology Program, Uppsala University (Sweden) 1980, M.S. in Natural Resources (Fisheries) Humboldt State University 1986. Principal Investigator and Lead Person for the DFG Fish Facilities Research Unit, responsible for the development, execution, analysis, and reporting of field and laboratory investigations of new and existing fish passage facilities in Sacramento-San Joaquin Estuary. Participated with the CALFED Fish Facilities Technical Team and with interagency teams involved with fish screening or passage issues. Became the Division's specialist on fishery hydroacoustic monitoring. Leading adult salmon passage monitoring program for mitigation measures for the Suisun March Salinity Control Gates. Coordinates DFG field and laboratory assistance to the UCD Fish Treadmill Project and acts as a technical advisor to the project. Directs up to three biologists, two FW Assistants, and several Scientific Aides. Joined DFG in 1987 at the Bay-Delta Division in Stockton, served there as a Range B Fishery Biologist on the Young Striped Bass Program and helped design and direct field and laboratory studies for egg and larval striped bass monitoring program. Promoted to Associate Water Quality Biologist and later Environmental Specialist III as the Principal Investigator and Lead Person of the DFG Aquatic Toxicology Laboratory, responsible for the development, execution, analysis, and reporting of toxicological studies and experiments at this facility until returning to Bay-Delta to his current position. A member of the American Fisheries Society and Society of Environmental Toxicology and Chemistry.

George W. Edwards, Biologist (Marine/Fisheries, Range B). B.S. in Biology University of Mississippi 1974, M.S. Biological Sciences U. Mississippi 1982. Fish Facilities Research Unit, March 1993 to present. Conducted studies in striped bass predation, growth, and movements at Clifton Court Forebay (south San Joaquin River Delta) and at the Suisun Marsh Salinity Control Gates (SMSCG) in Montezuma Slough. Conducted adult salmon biotelemetry monitoring studies in Suisun Marsh and Georgiana Slough. Participated in joint fish screening (treadmill) studies with U.C. Davis. Successfully completed training in the Aquatic Biotelemetry and Fish Passageways and Diversion Structures courses through the US Dept. Of the Interior-National Ecology Training Center and Hydroacoustics for Fisheries Assessment at the Hydroacoustic Technology Inc. Training center in Seattle, Washington. Member of Suisun Marsh Fisheries Technical Advisory Team and American Fisheries Society. 1991-1993, Environmental Specialist II DFG Environmental Services Aquatic Toxicology Laboratory, Elk Grove, Ca. Conducted aquatic toxicity tests with striped bass, neomysids, ceriodaphnia, rainbow trout and scuds.

Paul C. Macias: Fish and Wildlife Assistant I, Fish Facilities Research Unit, 12/95-present. 58 sem. units - Administration of Justice, Merced Community College 1984 and 32 sem. units- Biology, American River College. Assist biologists in deploying and retrieving various biological sampling gear, identifies, numerates, and records information. Often works as the small boat operator and field crew leader for the Fish Facilities Research Unit and other DFG Bay-Delta projects, such as the Georgiana Slough Acoustical Barrier Project (GSAB), Delta Smelt Project, North Bay Aqueduct Project, S.F. Bay Study, and Real Time Monitoring (RTM). Participates as a laboratory observer\crew leader for the UCD Treadmill Project. Joined DFG in 1981 as a Fish and Wildlife Seasonal Aid and helped the regional biologist for Merced County for three terms. Assisted the spawning and rearing of chinook salmon at the DFG Merced River Fish Facility for two terms. Promoted to Fish and Wildlife Assistant I in 1987 and worked as the primary laboratory and field support technician to the DFG Fish and Wildlife Water Pollution Control Laboratory.

Ramiro Soto: Fish and Wildlife Assistant I, Fish Facilities Research Unit, 1/92-present. Assists biologists with biological sampling, fish identification, numeration, data recording, and equipment maintenance. Often works as the small boat operator and field crew leader for the Unit and other DFG Bay-Delta projects, such as the Delta Smelt Project, North Bay Aqueduct Project, and RTM. Acts as a laboratory crew leader for the UCD Treadmill Project. Helped capture, tag, and track adult chinook salmon with radio and ultrasonic tags for barrier passage studies at the SMSCG and the GSAB. Also participated in the ultrasonic tracking of striped bass at Clifton Court Forebay. 1984-91: Scientific Aid for DFG Region 4 constructing and installing fish screens, artificial fish habitat structures for reservoirs, fish ladders, and fish traps. Lead CCC crews in habitat restoration projects and worked on creel censuses.

VII. Compliance with standard terms and conditions.

We agree to comply with all terms and conditions of the CALFED Proposal solicitation Package, May 1998, Attachment D, pages 95-98; and the attached "Standard Clauses - Interagency Agreements", which was listed as Item 3 in Table D-1 of the CALFED Proposal solicitation Package, May 1998, Attachment D, page 98.

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Attachment D
Terms and Conditions for State (CALFED) Funds

This section provides contract terms and conditions applicable to contracts issued in this budget category/topic. The specific terms and conditions may vary, depending on the applicant category (State entities, Federal and other public entities, non-profit organizations, and private entities), and the type of project (Public Works/Construction or Services), as identified in Table D-1.

Specific documents that should be submitted with the proposal are shown in Table D-1.

The general terms and conditions which will apply to Category III contracts funded with Proposition 204 funding are provided below.

In addition to these general terms and conditions, specific additional standard clauses will be applicable depending on the type of project and applicant category. Table D-1 provides a summary of those standard clauses for different types of projects and different applicant categories. Those standard clauses are provided at the end of this attachment.

1. Term of Contract: The term of the agreement will be dependent on the project and may range from 1 to 3 years. The agreement shall not become effective until fully executed by the parties and approved by CALFED.

2. Payment Schedule: No funds will be disbursed by State or NFWF to Contractor without 1) an executed copy of the Contract, (2) receipt of an original invoice with supporting documentation, and (3) receipt and satisfactory completion of deliverables and/or phases of work as set forth in the agreement, including quarterly financial and programmatic reports. Payments shall be in arrears on a monthly basis or after completion of agreed-upon project phases.

3. Budget Variances: Variances which exceed ten percent of a project task's approved budgeted amount should have approval in advance, with written explanations of programmatic changes to cover such variances and to remain within the maximum contract amount.

4. Subcontracts: Contractors are responsible for all subcontracted work. Subcontract terms and conditions should include all applicable contract terms and conditions as presented herein. Subcontractor agreements require approval by the State or NFWF, unless the subcontract is already a part of the contract agreement. Any amendments to subcontract should be approved by the State or NFWF. In obtaining subcontracts, contractor should obtain at least 3 competitive bids, or comply with the provisions of Government Code 4525 et seq., as applicable, or provide written justification for non-compliance with these requirements.

5. Substitution: Should the State or NFWF be dissatisfied with the work of subcontractors or employees of the contractor, the State or NFWF may require the contractor to substitute different qualified subcontractors or employees. The State or NFWF must approve such substitutions in advance of providing applicable services.

6. Conflict of Interest: Contractor shall comply with all applicable State laws and rules pertaining to conflict of interest, including but not limited to Government Code 1090 and Public Contract Code 10410 and 10411.

7. Standard of Professionalism: Contractor shall conduct all work consistent with the professional standards for the industry and type of work being performed under the contract.

8. Rights in Data: All data and information obtained and/or received under contract shall be in the public domain. Contractor shall have the right to disclose, disseminate and use, in whole or part, any final form data and information received, collected and developed under this agreement, subject to inclusion of appropriate acknowledgment of credit to the State or NFWF, CALFED, and all cost sharing partners for their financial support. Use of draft data requires pre-approval by State or NFWF and CALFED. Contractor shall not sell or grant rights to a third party who intends to sell such product as a profit-making venture.

9. Indemnification: The Contractor agrees to indemnify, defend and save harmless the State or NFWF, CALFED Agencies, the Resources Agency, or Department of Water Resources, its officers, agents and employees from any and all claims and losses accruing or resulting to any or all contractors, subcontractors, material persons, laborers, and any other person, firm or corporation furnishing or supplying work services, materials or supplies in connection with the performance of this contract, and from any and all claims and losses accruing or resulting to any person, firm or corporation who may be injured or damaged by the Contractor in the performance of this contract.

10. Independent Status: The Contractor, and the officers, agents and employees of Contractor, in the performance of the contract, shall act in an independent capacity and not as officers or employees or agents of the State of California, NFWF, CALFED Agencies, the Resources Agency, or Department of Water Resources.

11. Termination Clause: The State or NFWF may terminate this agreement and be relieved of the payment of any consideration to Contractor should Contractor fail to perform the covenants herein contained at the time and in the manner herein provided. In the event of such termination the State or NFWF may proceed with the work in any manner deemed proper by the State. The cost to the State shall be deducted from any sum due the Contractor under this agreement, and the balance, if any shall be paid the Contractor upon demand.

12. Assignment: Without the written consent of the State, this agreement is not assignable by Contractor either in whole or in part.

13. Integration Clause: No alteration or variation of the terms of this contract shall be valid unless made in writing and signed by the parties hereto, and no oral understanding or agreement not incorporated herein, shall be binding on any of the parties hereto. This contract may be amended upon mutual written agreement of the parties and approved by State or NFWF and CALFED.

14. Consideration: The consideration to be paid Contractor as provided herein, shall be in compensation for all of the Contractor's expenses incurred in the performance hereof, including travel and per diem, unless otherwise expressly so provided.

15. Severability: If any provision of this contract is held invalid or unenforceable by any court of final jurisdiction, it is the intent of the parties that all other provisions of this contract be construed to remain fully valid, enforceable, and binding on the parties.

Table D-1: Standard Contract Clauses and Related Proposal Submittal Requirements

	Standard Clauses and Proposal Requirements (see Note 1)	Services/Consulting/Preconstruction/ Research				Public Works/Construction			
Item (Note 2)		Agency*	Public*	Non-profit	Private	Agency*	Public*	Non-profit	Private
1	Public Entities		FC				FC		
2	Service and Consultant with Non Public Entity			FC	FC			FC	FC
3	Interagency	FC				FC			
4	Public Works						FC	FC	FC
5	Insurance Requirements						FC	FC	FC
6	Bidders Bond or other Security (if contract value > $107,000) see Note 3							P	P
7	Non-Discrimination Compliance		P	P	P		P	P	P
8	Certificate of Insurance						FC	FC	FC
9	Payment Bond						FC	FC	FC
10	Non Collusion		P	P	P				
11	Small Business Preference				P				P
n/a	Proof of Contractor's License							P	P

Note 1: All contract terms apply to any subcontracts made by contractor.

Note 2: Item numbering refers to the copies of the documents as attached following this table.

Note 3: Types of security include cashiers check, cash, certified check or bidder's bond in an amount equal to 10 percent of the amount of the proposal.

* Agency: State of California agencies, including State (California) Universities.
Public: Federal agencies and other public entities, such as city, county, other local government entities, resource conservation districts, and out-of-state public universities.

ITEM 3

Agreement No. _____

Exhibit _____

STANDARD CLAUSES -
INTERAGENCY AGREEMENTS

Audit Clause. For contracts in excess of $10,000, the contracting parties shall be subject to the examination and audit of the State Auditor for a period of three years after final payment under the contract. (Government Code Section 8546.7).

Availability of Funds. Work to be performed under this contract is subject to availability of Category III funds through the State's normal budget process.

Interagency Payment Clause. For services provided under this agreement, charges will be computed in accordance with State Administrative Manual Section 8752.

Termination Clause. Either State agency may terminate this contract upon 30 days advance written notice. The State agency providing the services shall be reimbursed for all reasonable expenses incurred up to the date of termination.